



A.D. 1859, *6th OCTOBER.* N° 2284.

S P E C I F I C A T I O N

OF

GEORGE GIBSON AND JAMES GIBSON.

MACHINERY FOR RAISING AND REMOVING
SOIL OR EARTH FROM SEWERS, &c.

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A.D. 1859, 6th OCTOBER. N^o 2284.

**Machinery for Raising and Removing Soil or Earth
from Sewers, &c.**

LETTERS PATENT to George Gibson and James Gibson, of Southall, in the County of Middlesex, Surveyors, for the Invention of “ **IMPROVED MACHINERY FOR RAISING AND REMOVING SOIL OR EARTH FROM SEWERS AND OTHER EXCAVATIONS.**”

Sealed the 16th March 1860, and dated the 6th October 1859.

PROVISIONAL SPECIFICATION left by the said George Gibson and James Gibson at the Office of the Commissioners of Patents, with their Petition, on the 6th October 1859.

We, GEORGE GIBSON and JAMES GIBSON, of Southall, in the County of Middlesex, Surveyors, do hereby declare the nature of the said Invention for “ **IMPROVED MACHINERY FOR RAISING AND REMOVING SOIL OR EARTH FROM SEWERS AND OTHER EXCAVATIONS,**” to be as follows :—

Our Invention of improved machinery for raising and removing soil or earth from sewers and other excavations, has for its object to economise the time and labor required for excavating earth from any considerable depth below the surface of the ground. The Invention is intended to be applied more particularly to excavating earth for the formation of sewers and other similar works, which extend to considerable length, but are from their nature rather confined in width.

Our Invention consists in mounting a series of buckets on an endless chain or chains, which are extended round pairs of quadrangular or other suitable pulleys, drums, or wheels, one of which is mounted in a moveable framework placed on ways above the cutting or excavation, and the other pulley, drum, or wheel is mounted in bearings at the bottom of the excavation. The frame-

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work, for facility of movement, may be mounted on wheels, and is extended across the excavation, so that the endless chain of buckets is suspended vertically therein.

The endless chains are constructed in such a manner as to admit of them being lengthened from time to time with facility by the addition of one or 5 more links as the depth of the excavation increases. We prefer to attach the buckets to the chains at distances of from five to six feet apart, and by communicating motion to the chains by means of suitable gearing actuated by any convenient prime mover, an ascending motion is communicated to the buckets. The speed of this motion must of course be regulated according to 10 the ability of the workmen to fill the buckets within a given time as they ascend. When the buckets have risen to the top of the framework above, they, in passing round to the pulley, drum, or wheel at top, are of course turned over, and their contents are thrown out on to a moveable inclined shute, which conducts it either direct to a cart, or, by means of a travelling endless 15 band, the earth or soil may be removed to any convenient distance, and ultimately delivered into any suitable receptacle. When the bucket has deposited its contents on the inclined shute, the latter must be moved back in order to allow the empty bucket to pass down into the excavation again; this is effected automatically by means of a crank, excentric, or other suitable 20 mechanical contrivance adapted to and actuated by the gearing whereby the chain is moved. The empty bucket having descended past the inclined shute, the latter is moved back again to its original position, in order to receive the contents of the next bucket, after which it will be again drawn back to allow this second empty bucket to pass, and so on in continuous succession, until 25 the whole of the earth or soil is removed, and the excavation made to the proper depth. We find it convenient to work three or more sets of buckets in combination, the several sets being arranged at convenient distances apart to suit the workmen. When the sewer or other work has been excavated to the proper depth, the machine must be moved along the ways to a fresh 30 portion of the intended excavation, and in order to do this, it will be necessary to remove the endless chains, so as to allow the machine to pass the struts or lateral supports in the excavation. When the machine has been brought above the unexcavated portion, the chains, after being shortened to the reduced length required to begin afresh, may be again replaced, and the lower 35 pulleys, drums, or wheels placed as low down on the ground as possible, and the digging and filling operations may then be renewed.

G. & J. Gibson's Improved Machinery for Raising Soil or Earth from Sewers.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said George Gibson and James Gibson, in the Great Seal Patent Office on the 5th April 1860.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, **GEORGE GIBSON** and **JAMES GIBSON** of Southall, in the County of Middlesex, Surveyors, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Sixth day of October, in the year of our Lord One thousand eight hundred and fifty-nine, in the twenty-third year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said George Gibson and James Gibson, Her special license that we, the said George Gibson and James Gibson, our executors, administrators, and assigns, or such others as we, the said George Gibson and James Gibson, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVED MACHINERY FOR RAISING AND REMOVING SOIL OR EARTH FROM SEWERS AND OTHER EXCAVATIONS**," upon the condition (amongst others) that we, the said George Gibson and James Gibson, by an instrument in writing under our hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said George Gibson and James Gibson, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the Drawings hereunto annexed, and to the letters and figures marked thereon (that is to say):—

Our Invention of "**Improved Machinery for Raising and Removing Soil or Earth from Sewers and other Excavations**," has for its object to economise the time and labour required for excavating earth from any considerable depth below the surface of the ground. The Invention is intended to be applied more particularly to excavating earth for the formation of sewers and other similar works, which extend to considerable length, but are from their nature rather confined in width.

Our Invention consists in mounting a series of buckets on an endless chain

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or chains, which are extended round pairs of quadrangular or other suitable drums or wheels, one pair of which is mounted in a moveable framework placed on ways above the cutting or excavation, and the other pair of pulleys, drums, or wheels is secured at the bottom of the excavation. The framework, for facility of movement, may be mounted on wheels, and is to be extended 5 across the excavation, so that the endless chain of buckets may be suspended vertically therein.

The endless chains are constructed in such a manner as to admit of them being lengthened from time to time with facility by the addition of one or more links as the depth of the excavation increases. We prefer to attach the 10 buckets to the chains at distances of from five to six feet apart, and by communicating motion to the chains by means of suitable gearing actuated by any convenient prime mover, an ascending motion can be communicated to the buckets. The speed of this motion must of course be regulated according to the ability of the workman to fill the buckets within a given time as they 15 ascend. When the buckets have risen to the top of the framework above, they, in passing round the pulleys, drums, or wheels at top, are of course turned over, and the soil or earth contained therein is thrown out on to a moveable inclined shoot, which conducts it either direct to a cart, or by means of a travelling endless band, the earth or soil may be removed to any con- 20 venient distance, and ultimately delivered into any suitable receptacle. When the bucket has deposited its contents on the inclined shoot, the latter must be moved back in order to allow the empty bucket to pass down into the excavation again; this is effected automatically or by self-acting machinery, by means of a crank, excentric, or other suitable mechanical contrivance 25 adapted to and actuated by the gearing whereby the chain is moved. The empty bucket having descended past the inclined shoot, the latter must be moved back again to its original position in order to receive the contents of the next bucket, after which it will be again drawn back to allow this second empty bucket to pass down, and so on in continuous succession, until the 30 whole of the earth or soil is removed, and the excavation made to the proper depth. We find it convenient to work two or more sets of buckets in combination, the several sets being arranged at suitable distances apart to suit the convenience of the workmen. When the sewer or other work has been excavated to the proper depth, the machine must be moved along the ways to 35 a fresh portion of the intended excavation, and in order to do this, it will be necessary to remove a portion of the endless chains, so as to allow the machine to pass the struts or lateral supports in the excavation. When the machine has been brought above the unexcavated portion, the chains, after being

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shortened to the reduced length required to begin afresh, may be again replaced, and the lower pullies, drums, or wheels placed as low down on the ground as possible, and the digging and filling operations may then be renewed.

5 In the accompanying Drawings, Fig. 1 is a side view of the machine, and Fig. 2 a transverse section. A, A, is a carriage constructed of timber, and mounted on axles a, a, a, a , of wood or iron, which pass through the running wheels B; these latter are provided with wide felloes, and are intended to run on planks or plate iron ways turned up at the sides as flanges or guides for
 10 the wheels, and securely attached to timber planks C, placed on each side of the excavation. At one end of the carriage a strongly trussed timber framework is to be formed, upon which a portable steam engine D is fixed for the purpose of giving motion by means of suitable gearing to the longitudinal shafting E, on which are mounted bevelled toothed pinions e, e , which by
 15 means of the bevil wheels e^x , communicate motion to the transverse shafting f, f . On each of the transverse shafts f, f , tumblers or square pullies g, g , are mounted, and flanges are formed in the side faces of each of these tumblers or pullies, in order to receive the links of the endless chains h, h . Buckets i, i , are attached to every fourth link of these chains h , the links being formed
 20 similar in length to the sides of the square pullies or tumblers g . Other square pullies or tumblers g^x, g^x , provided with short shafting, are to be fixed at the bottom of the excavation. These tumblers, g^*, g^* , rest in or are carried by the endless chains h, h , and are held in place by small chains i^*, i^* , which are secured to some of the timbers near, as shewn in the Drawings.
 25 A portion of one of the endless chains h, h , is shewn detached at Figs. 3, and a modification of the same at Fig. 4. At every fourth joint of the endless chain the joint pin is made moveable, for the purpose of facilitating the addition of a further length of chain, and the lowering of the tumblers g^* as the excavation proceeds. The joint pin of the endless chains can be removed at
 30 the bottom of the excavation, and necessitates but a slight loss of time consequent on stopping the chains so lengthened. Only four links with one bucket would probably be required to be added from time to time as the excavation progresses; the soil being first dug by the labourers below, is to be thrown up in the form of a loose mound or heap, as shewn in the
 35 Drawing.

The descending buckets will then pass into and lift the loose soil up to the top of the excavation, and on passing over the upper tumblers or pullies g , the buckets will discharge the soil on to a moveable shoot k, k , fixed in an inclined position for the purpose of more readily discharging the soil from thence on to

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the endless travelling band or platform l, l . The shoots k are constructed by preference of galvanized iron plate fitted on to a wooden bottom, and provided with light angle iron sides. Cast iron carriages k^* are fixed on the hinder part of the shoots k , and are provided with small rollers, which work on iron rails m, m . The shoot is made to traverse to and fro on the iron rails m , and 5 to pass between the descending buckets on either side, and the buckets discharge their contents on to the shoot as the latter approaches the respective chains. The movement of the shoot to and fro between the buckets is effected by means of the excentrics n, n , which are mounted on the transverse shafting f . The arms of the excentrics are connected to levers n^1, n^2 , which 10 have their fulcra at n^x . The lower ends of these levers n^1 are connected either directly or by means of links to the sides of the shoot k , and therefore, as they are worked, they move the shoots to and fro on the rails m, m . The soil is discharged from the shoots k on to the endless travelling platform l, l , which is proposed to be formed either of good strong tarred canvas working 15 round cylindrical drums, as shewn in the Drawing, or it may be constructed of endless chains or bands, to which are secured wrought-iron plates of suitable width and length, each plate being made to lap over that adjoining. The plates should be rivetted on to three endless chains made of square links, each about five inches long; the plates must be rivetted on to the solid links, and 20 the hollow links fit over a peg on hexagonal or other suitably-shaped pulleys, which receive motion from the upper longitudinal shafting E by means of an endless leather strap or band passing round suitable pulleys, as shewn in Fig. 1. By this means motion is conveyed to the platform or travelling endless band, which passes round a similar but smaller pulley at the outer end, which is 25 supported by iron rods l^* . The soil is by this means carried forward on the travelling platform or endless band over the side of the excavation, and is deposited in a heap, as shewn in the Drawing, or is allowed to fall into carts, earth waggon, or wheel barrows, as required, by means of a crossed driving band and a similar shafting to that described as working the platform. On 30 one side of the apparatus a similar platform is made to work on the opposite side of the machine for the purpose of discharging the excavated soil on the other side, if it should be considered more convenient to deliver the soil on both sides simultaneously.

Having now described our Invention of "Improved Machinery for Raising 35 and Removing Soil or Earth from Sewers and other Excavations," and having explained the manner of carrying the same into effect, we would remark that, although we have shewn and described the best method with which we are acquainted for carrying out our Invention, it will be evident that the arrange-

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ment of the several parts may be considerably varied, without departing from the nature and object of our Invention ; we do not, therefore, mean or intend to confine ourselves rigidly thereto.

In conclusion, we claim, as the Invention secured to us by Letters Patent
5 as aforesaid, the arrangement of machinery described for raising and removing earth or soil, or any mere modification thereof.

We claim particularly the use of a travelling chain provided with buckets in combination with a moveable shoot, or other equivalent contrivance for receiving the contents of the buckets, as described.

10 In witness whereof, we, the said George Gibson and James Gibson, have hereunto set our hands and seals, this Fifteenth day of March, in the year of our Lord One thousand eight hundred and sixty.

GEORGE GIBSON. (L.S.)

JAMES GIBSON. (L.S.)

15 Witness,

J. W. MOFFATT,

66, Chancery Lane.

LONDON :

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G&J. GIBSON'S SPECIFICATION.

FIG. 1.

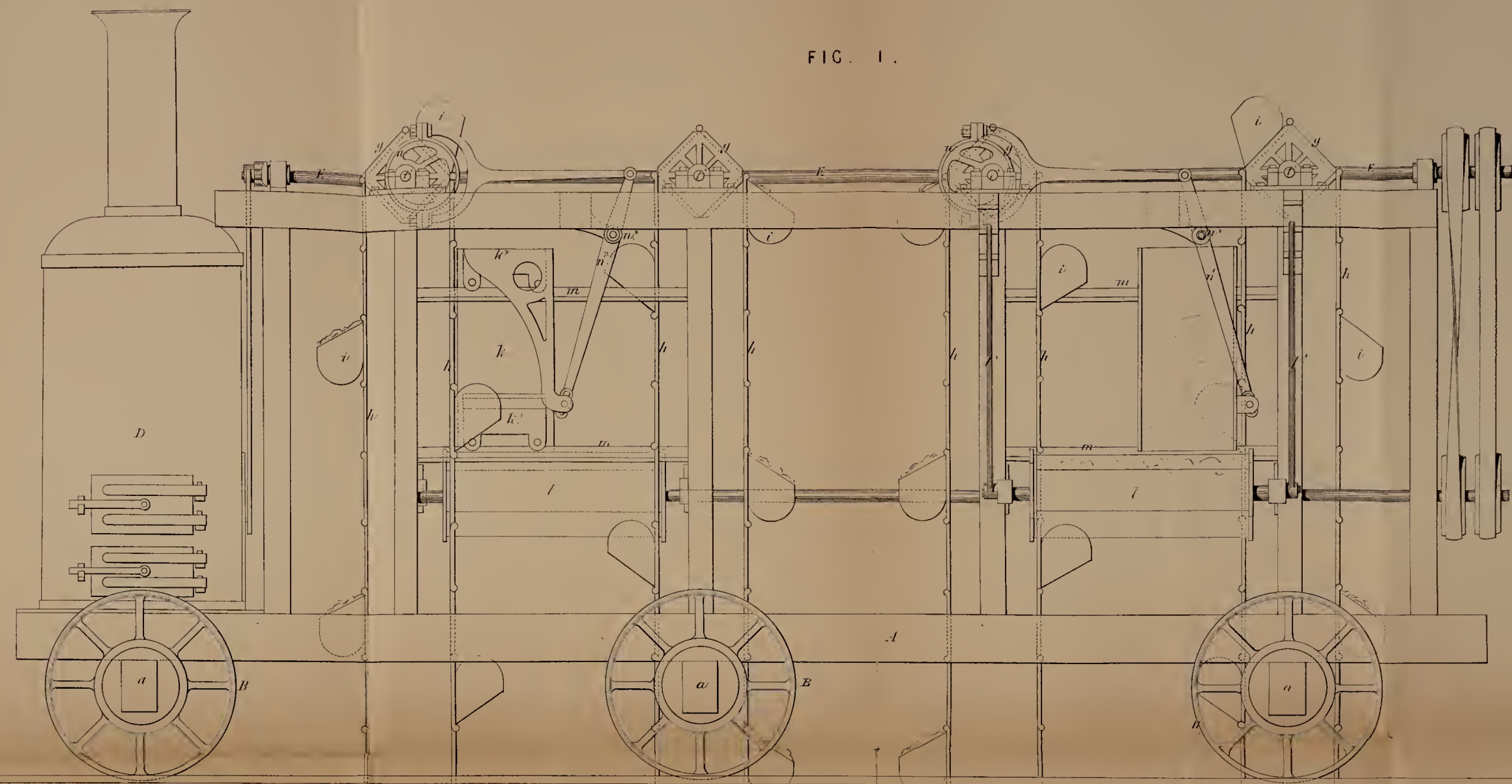


FIG. 3.

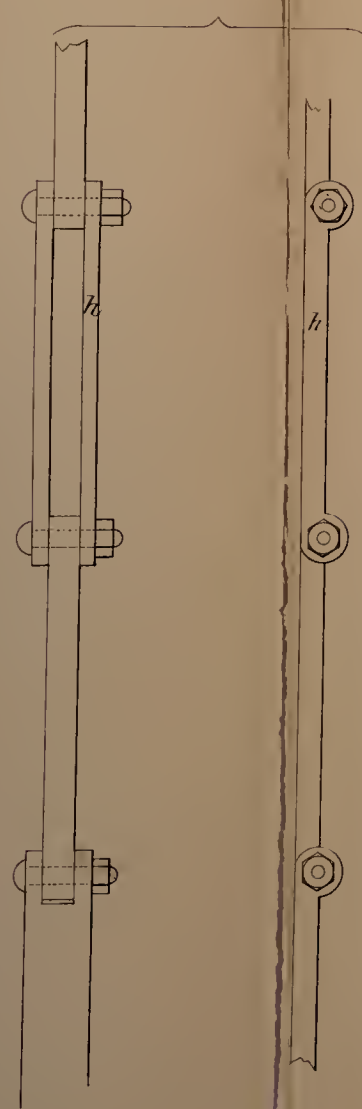
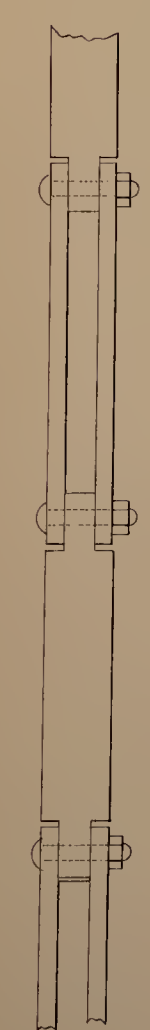


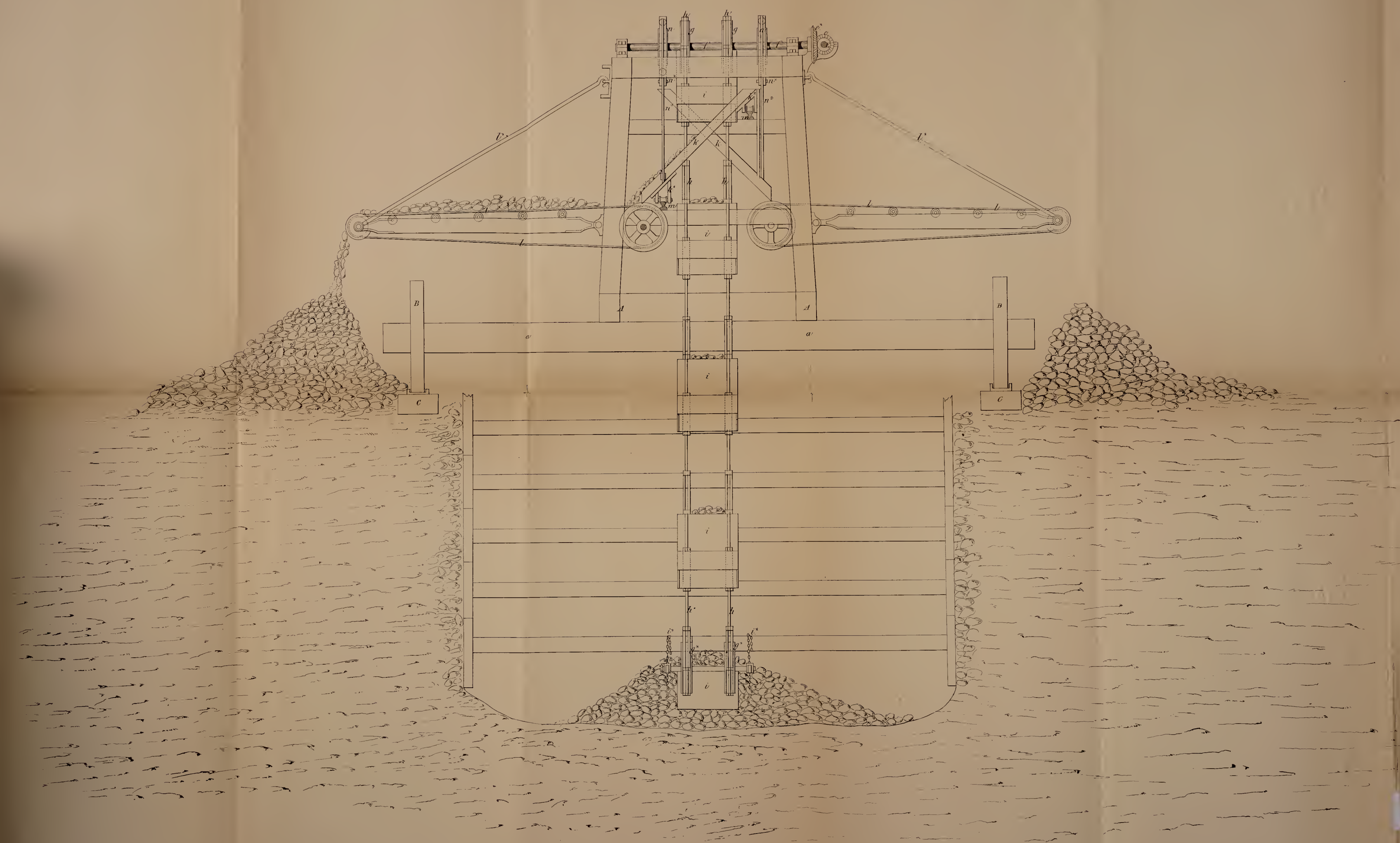
FIG. 4.



The steel drawing is partly colored.

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FIG. 2.



The steel drawing is colored.

Drawn on Stone by Malby & Sons

